Emergency Managers Weather Information Network (EMWIN)

"A Time of Transition"

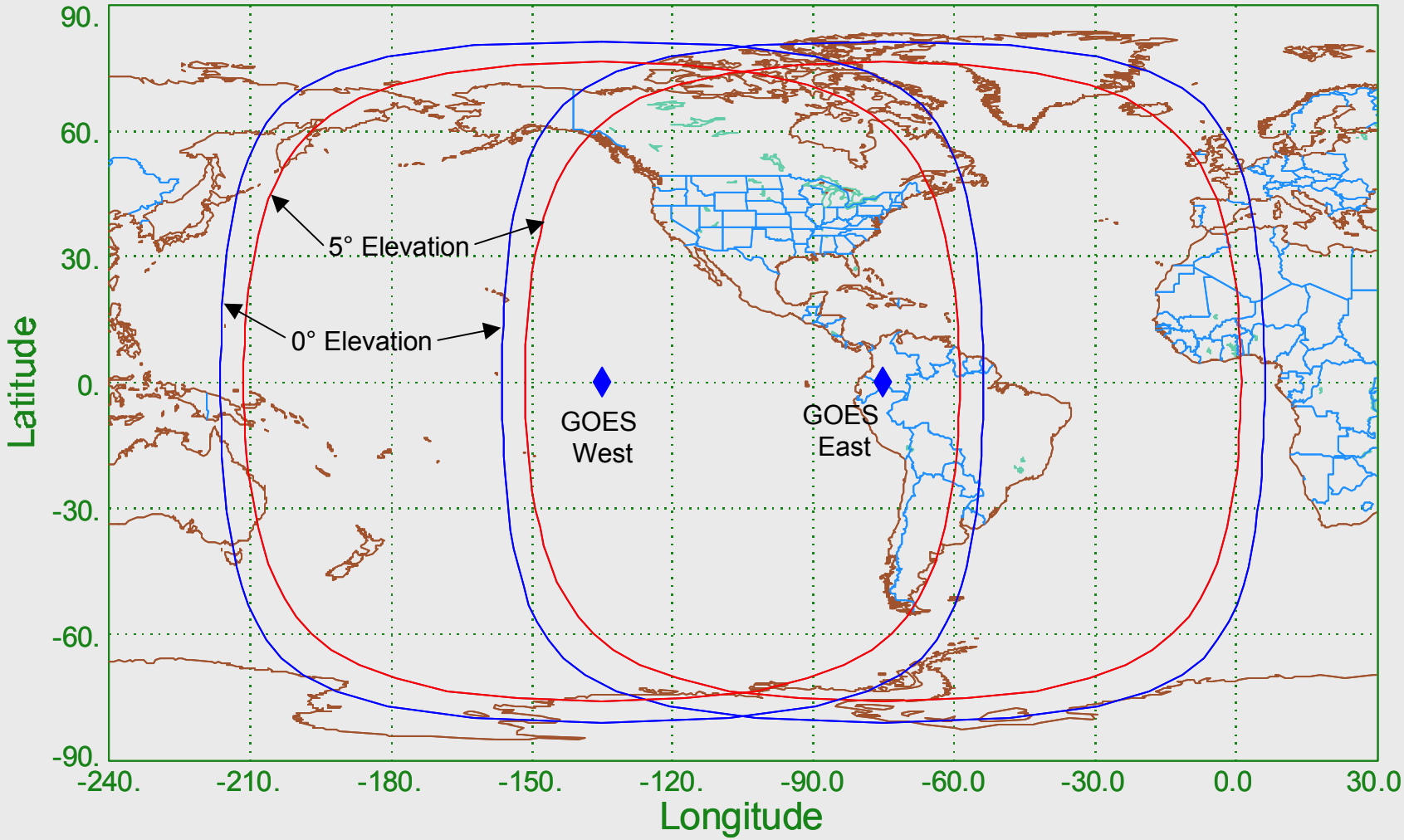
OVERVIEW

- What is EMWIN?
- What must change?
- When will changes occur?
- Transition objectives
  - Informing & Listening
  - Planning
  - System & prototype receiver design
  - Prototype implementation Schedule
- Conclusion

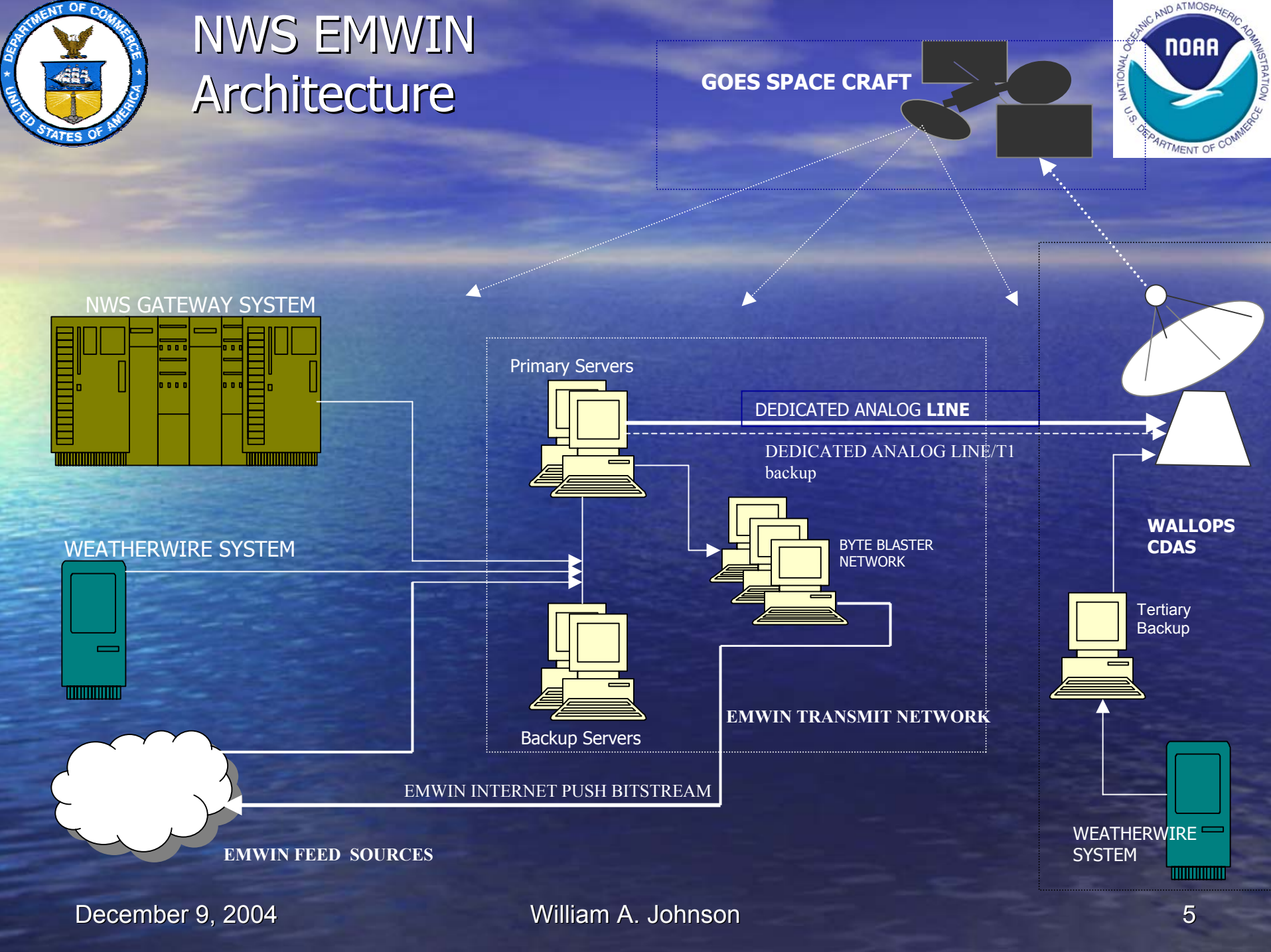
What is EMWIN?

- A dissemination system providing timely watches, warnings, forecasts other hydro-meteorological products, graphics and satellite imagery
  - Uses NOAA's GOES satellites and low cost user receive systems
- Data content prioritized to needs of emergency managers
- Satellite broadcast from GOES East and West
  - Rebroadcast in Pacific via PeaceSat
  - Rebroadcast on VHF radio in certain areas
  - Same bit stream available on Internet

GOES Visibility Contours



NWS EMWIN Architecture



What must change?

- With advent of GOES-N/P satellite generation
  - Broadcast power must be reduced to comply with ITU power limits:
    - From: 51.0 dBmi (minimum EIRP)
    - To: 44.8 dBmi (minimum EIRP)
  - Frequency must change:
    - From: 1690.725 MHz
    - To: 1692.700 MHz
  - Modulation must change to partly offset reduction in broadcast power:
    - From: DFSK modulation
    - To: OQPSK modulation
  - Forward Error Correction (FEC) coding added to offset balance of power reduction and allow increased data rate

When Could Changes Occur?

- 2005 - 2011
  - GOES-N launch
    - Official date: March 31/April 1 2005
    - Unofficial date: Not Earlier Than (NET) July 2005
  - GOES-N Operational
    - First broadcast of new EMWIN-N service:
      - As early as 6-8 months after GOES-N launch
      - As late as early 2011
      - Depends on fuel usage and subsystem health for both GOES 11 and GOES 12

GOES N/P EMWIN Transition Objectives

- Listen to users & vendors
  - Keep them informed of changes
- Prepare and update a transition plan
  - Provide adequate time for changes to be made
- Establish an overall system design
  - Develop a proof-of-concept prototype receiver
  - Release schematics and operating software to industry for individual design and production

Informing & Listening

- EMWIN website - http://iwin.nws.noaa.gov/emwin/index.htm
- EMWIN user groups
- Local outreach programs
  - Via Warning Coordination Meteorologists in Weather Forecast Offices
- Special conferences
  - User-vendor conference at NWS Hq, April 2004
  - Southeast U.S. EMWIN Workshop at Huntsville, AL, October, 2004

Informing & Listening cont'd
User-Vendor Conference Highlights

- Provided latest information on transition planning
- Demonstrated feasibility of a 9.6 kbps prototype software-defined receiver design
- Users and vendors urged:
  - Increasing the system data rate to 19.2 kbps
  - Keeping transition costs as low as possible
  - Making EMWIN data stream available as part of LRIT

Informing & Listening cont'd
User-Vendor Conference Conclusions

- User & vendor recommendations accepted by NWS and NESDIS
  - NESDIS has determined technical feasibility of 19.2 kbps data rate
  - Prototype software-defined receiver design being amended & expected to be ready for testing in January, 2005
  - Design will incorporate new features intended to lower costs for commercial vendors
  - Planning in progress to include EMWIN data stream in LRIT broadcasts

Transition Planning

- Joint NWS/NESDIS co-ordination team
  - Formed to plan the transition activities
  - NWS is focal point for public contact
  - NESDIS responsible for prototype receiver development and testing
- Initial transition plan approved in December, 2003
  - Updated version now in preparation

Overall System Design

- Existing EMWIN on GOES I/M
  - 9.6 kbps data rate
  - Dual frequency shift keying (DFSK)
  - No forward error correction
- Changes for GOES N/P
  - Proposed link budget on NWS EMWIN web site
  - Increased data rate to 19.2 kbps will require changing modulation scheme to offset quadrature phase shift keying (OQPSK)
  - Reduced broadcast power will require forward error correction
    - Convolutional rate ½ + Reed-Solomon FEC

Prototype Receiver Design

- Key design concepts
  - Minimum dish antenna size will be retained at one meter
  - Hardware implementation scheme for intermediate frequency conversion
  - Use of OQPSK and forward error correction to compensate for lower power level
  - Software-defined receiver for demodulation and decoding functions
  - Capable of receiving either existing GOES I/M signal or new GOES N/P signal

Prototype Implementation Schedule

- 2004
  - Design and build 19.2 kbps prototype
  - Begin factory testing of prototype
- 2005
  - Factory testing complete
  - Bench testing of prototype at NOAA facility
  - Live testing of prototype using GOES-N satellite
  - GOES-N stored on-orbit
  - Release 19.2 kbps spec and design to industry for mass production of EMWIN station

Conclusion

- "Round – Robin" session to follow
  - Will address any quick questions
  - Fill out a question sheet for more detailed response
- Break out Session after lunch
  - Will cover details on key items
  - Focus on your questions